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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/562,678	02/24/2006	Joachim Rosler	P29080	8281

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EXAMINER	
D'ANIELLO, NICHOLAS P	
ART UNIT	PAPER NUMBER
4111	

NOTIFICATION DATE	DELIVERY MODE
01/09/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/562,678	ROSLER ET AL.	
	Examiner	Art Unit	
	Nicholas P. D'Aniello	4111	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 December 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14 and 16-21* is/are rejected.

7)☒ Claim(s) *15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8/22/2006 and 8/24/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 21 is rejected under 35 U.S.C. 102(b) as being anticipated by Whang et al. (US Patent No. 4,512,826).

Whang et al. teach a titanium alloy (for producing a work piece made from a titanium based alloy) comprising lanthanum in the content of 0.1 to 2.0 atomic percent. Since the lanthanum content taught by Whang et al. is extremely narrow and significantly overlaps with sufficient specificity to the range in claim 21, the titanium alloy of Whang therefore anticipates claim 21 (column 3 lines 37-43).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-3, 5-8, 10-11 and 16 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Lederich et al. (US Patent No. 4,415,375) in view of Zwicker et al. (US Patent No. 2,892,742) and Beall (US Patent No. 1,360,358)

Lederich et al. teach a method of machining a titanium alloy by first performing a "hydrogen charging step" where the work piece is heated in a hydrogen containing atmosphere during which the work piece absorbs the hydrogen. The titanium work piece is then formed in a die press (machined) and the hydrogen is removed by heating the work piece in a vacuum (hydrogen free atmosphere) (column 3 lines 28-67). Although not specifically taught, a cooling step would naturally flow in the process of Lederich et al. since the work piece would be exposed to a natural cooling as it is removed from the furnace and exposed to an ambient atmosphere. In any event, it would have been obvious to include a cooling step in the process of Lederich et al. because Zwicker et al. teach a process for improving the workability of titanium alloys using a similar hydrogen charging process where the hydrogen is later removed where the work piece is allowed to cool after the hydrogen charging step prior to the hydrogen removal (column 2, *Example 1*). This claim differs from Lederich et al. in calling for metal-removing machining of the work piece because it is unclear whether metal is removed during the die pressing (i.e. machining) step of Lederich et al. However, it would have been obvious in the art to remove the excess metal from the work piece after the die pressing in the process of Lederich et al. as such is an art

recognized technique for die-pressing a metallic material as exemplified in the teachings of Beall (page 1 lines 47-57).

Regarding claim 2, Lederich et al. teach that the hydrogen is typically removed by heating the formed part in a vacuum (column 3 lines 63-67).

Re claim 3, Lederich et al. teach that the hydrogen charging step is performed between 600°-760°C (873K-1033K) (column 3 lines 49-50).

Re claim 5, Lederich et al. teach that the hydrogen charging step (annealing time in hydrogen containing atmosphere) is performed for two hours prior to forming (column 4 lines 23-24).

Re claim 6, Lederich et al. is silent regarding a cooling step, however it would have been obvious to cool the work piece in a hydrogen containing atmosphere because Zwicker et al. teach that the work piece is heated in an oven containing hydrogen and allowed to cool in the same oven (column 2 lines 41-44).

Re claim 7, although Lederich et al. is silent regarding a quantitative value of the vacuum pressure it would have been obvious to use a vacuum pressure of least $2 \cdot 10^{-3}$ Pa because Zwicker et al. teach that the hydrogen is removed under a **high** vacuum (column 2 lines 46-48).

Re claim 8, Lederich et al. teach, in one example, that the hydrogen removal step is performed at 650°C (923K) (column 4 lines 33-36).

Re claims 10 and 11, Lederich et al. teach that the hydrogen content introduced into the alloy should be between 0.1 and 0.5 weight percent to improve the formability, above 0.2 weight percent preferably (column 3 lines 19-22).

Additionally, Zwicker et al. teach the hydrogen composition to be 0.505% after the hydrogen charging step (column 2 lines 41-44).

Re claim 16, Lederich et al. teach that this process is suitable for Ti-6Al-4V (column 3, lines 11-13).

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lederich et al. (US Patent No. 4,415,375) and Zwicker et al. (US Patent No. 2,892,742) as applied to claim 1 above, and further in view of Smickley et al. (US Patent No. 4,505,764).

Lederich et al. in view of Zwicker et al. teach the method as presented in independent claim 1. Claim 4 differs from Lederich et al. and Zwicker et al. in calling for the hydrogen containing atmosphere to be under a pressure of approximately 5 kPa. However, it would have been obvious in the art to use a pressure of around 6.9 kPa because Smickley et al. teach a method of refining the microstructure of titanium by heating the work piece in a hydrogen containing atmosphere where the pressure is kept constant around 1 psi (which converts to roughly 6.9 kPa) (column 9, *Example 1*). Approximately 5 kPa is taken to read on around 6.9 kPa. In any event, it would have been obvious to use a pressure of approximately 5 kPa because one in the art would have reasonably expected that substantially the same desired result would be achieved as this is close to the pressure (around 6.9 kPa) taught by Smickley et al.

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lederich et al. (US Patent No. 4,415,375) and Zwicker et al. (US Patent No. 2,892,742) as applied to claim 1 above, and further in view of Garg et al. (US Patent No. 4,902,535).

Lederich et al. in view of Zwicker et al. teach the method as presented in independent claim 1. Claim 9 differs from Lederich et al. and Zwicker et al. in calling for the heating to be carried out inductively, whereas the references are silent on the mechanism of heating. However, it would have been obvious in the art to use an inductive furnace because Garg et al. teach a method for depositing coatings on titanium where the work piece is heated in an inductive graphite furnace which has hydrogen containing atmosphere (column 6, *Control 1*).

7. Claims 12-13 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Lederich et al. (US Patent No. 4,415,375) and Zwicker et al. (US Patent No. 2,892,742) as applied to claim 1 above, and further in view of Fisher et al. (US Patent No. 5,211,775).

Lederich et al. in view of Zwicker et al. teach the method as presented in independent claim 1. The claims 12-14 differ from Lederich et al. and Zwicker et al. in calling for a removal of the oxide layers using an etching process. However, it would have been obvious in the art to remove the oxide layers of the titanium work piece prior to heating because Fisher et al. teach a method of removing oxide layers from titanium work pieces using an etching solution containing nitric acid (HNO_3) (column 2 line 66 – column 3 line 3) because

oxygen enriched area form very hard surface layers which low ductility which cause deterioration of strength and other mechanical properties in titanium (column 1, lines 49-52).

8. Claim 14 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Lederich et al. (US Patent No. 4,415,375), Zwicker et al. (US Patent No. 2,892,742) and Fisher et al. (US Patent No. 5,211,775) as applied to claim 14 above, and further in view of Borowik (US Patent No. 2,974,021).

Lederich et al., Zwicker et al. and Fisher et al. teach the desirability to etch the oxide layer of a titanium work piece before improving the workability with a hydrogen charging step. Claim 15 differs from the references in calling for a composition comprising water, nitric acid, hydrofluoric acid and hydrogen peroxide for the etching solution. However it would have been obvious in the art to use a solution of hydrofluoric acid, hydrogen peroxide, nitric acid and water could be used because Borowik teach a solution for etching titanium containing 10 parts by volume of 48% C.P. hydrofluoric acid, 60 parts by volume of U.S.P. 3% hydrogen peroxide, 10 parts by volume of commercial 69.3% nitric acid, and 30 parts by volume of distilled water (column 2, claim 1).

9. Claim 17-20 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Lederich et al. (US Patent No. 4,415,375) and Zwicker et al. (US Patent No. 2,892,742)

as applied to claim 16 above, and further in view of Whang et al. (US Patent No. 4,512,826).

Lederich et al. in view of Zwicker et al. teach a method for machining Ti-6Al-4V as applied to claim 16. Claims 17 and 18 differ from Lederich et al. and Zwicker et al. in calling for a Ti-6Al-4V alloy with lanthanum in the content of 0.3 to 3.0 atomic percent. However, it would have been obvious in the art that lanthanum could be included because Whang et al. teach a method of precipitation hardening titanium alloys by adding a rare earth element (preferably lanthanum) in the amount of 0.1 to 2.0 atomic percent because it is relatively cheap (column 3 lines 37-43).

Regarding claims 19 and 20, while Whang et al. teach lanthanum to be the preferred rare earth element because it is relatively cheap, they also teach Ce (cereium) to be an acceptable alterative in the amount of 0.1 to 2.0 atomic percent (same section).

Allowable Subject Matter

10. Claim 15 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: Although Borowik teaches a solution for etching titanium containing 10 parts by volume of 48% C.P. hydrofluoric acid, 60 parts by volume of U.S.P. 3% hydrogen peroxide, 10 parts by volume of commercial 69.3% nitric acid, and 30

parts by volume of distilled water (column 2, claim 1) this claim distinguishes over the prior art of record by defining the ratio of the components to differ substantially such that one of ordinary skill in the art would not consider the solution an obvious variant. More specifically, the composition in claim 15 requires a much larger concentration of nitric acid and much less hydrogen peroxide and hydrofluoric acid (see table below).

	Claim 15 (mL)	Borowik (parts)
Water	50	30
Hydrogen Peroxide	8.5	60
Nitric Acid	50	10
Hydrofluoric Acid	1.5	10
TOTAL	110	110

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nicholas P. D'Aniello whose telephone number is (571)270-3635. The examiner can normally be reached on Monday through Thursday from 8am to 5pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sam Chuan Yao can be reached on (571) 272-1224. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

NPD
1/2/2008

/Sam Chuan C. Yao/
Supervisory Patent Examiner, Art Unit 4111